TABLE II

OPTICAL EQUIPMENT LIST

	Item	Description	Precision
#1	Diopter telescope	This is one of the most important pieces of equipment in the kit. In order to accurately magnify microscope imagery for measurements of resolution, depth of focus, parfocalization, etc., a telescope of the highest quality is required. It must not introduce any additional aberrations into the system. Its uses are too numerous to give in this proposal. However, a more complete description of its applications will be furnished in the operator's manual supplied with the kit. The telescope selected has the decided advantage of "standardizing" the operator's eye. It eliminates confusing eye accommodation from the operator's eye and is adjustable to standardize the acuity of different individuals. An eyepiece reference scale allows a convenient method of returning to a particular individual's eye. It also includes a focusing adjustment calibrated from -6 to +8 diopters in 1/4 diopter increments for measuring accommodation ranges in adjustable binocular eyepieces. The 3X magnification allows the operator to check resolutions of instruments exceeding the resolution capability of the eye. It is felt that no compromise of either quality or versatility can be tolerated in fulfilling these specific requirements of the kit. This instrument will certainly not be a compromise in either respect.	1/4 diopter
#2	10X eyepiece	A 10X wide field eyepiece,which will accommodate the 21mm reticles supplied in this kit will be included. It will be calibrated under the contractor's supervision. However, calibration of this eyepiece is not considered necessary for the performance of any of the tests herein described. This calibration can optionally be deleted by the sponsor with an appropriate reduction in the cost of the kit. It should be noted that the only calibrations necessary must be performed on the equipment to be tested with the aid of a stage micrometer.	

TABLE II. (cont'd.)

	Item	Description	Precision
#3	Astigmatism and orthogonality target	This item will be custom manufactured. No standard targets for astigmatism could be found. The target consists of 29 cross lines located on the X and Y axes of the target plate as well as on the diagonals. For astigmatism the plate is designed to accommodate fields of view from 2mm to approximately 100mm. The cross lines will be approximately 5 microns wide. For economy, both the targets for astigmatism and orthogonality were put on the same plate. For orthogonality and linear dimensional check of mechanical stages, the positions of each cross line center will be accurate to ± 5 microns. On X and Y translations of 3.5 inches each, the accuracies at the right are applicable. The target will be a vacuum deposition of chrome on glass. This type of target is easy to view with transillumination and was chosen over other target materials because of its durability.	Orthogonality to better than 0.5 minute of arc. Length to ± 0.0002 inch.
#4	21mm reticle	0.5mm squares making a grid over entire field of view for distortion tests	0.5mm
#5	21mm reticle	Cross line scales 10mm long horizontally and vertically, each divided into 100 parts.	0.1mm
#6	21mm reticle	24 concentric circles, 0.5mm to 12mm diameter in 0.5mm increments	0.5mm

TABLE II (cont'd.)

	Item	Description	Precision
#7	Resolution target	The resolution target will consist of three groups. Each group will contain 11 patterns covering ranges from 1 to 10 l/mm, 10 to 100 l/mm and 100 to 1000 l/mm respectively. Each single frequency pattern will contain 15 clear bars on an opaque background. Maximum variation in width between the light and dark bars will be less than 5% over the range from 1 to 300 l/mm. Density difference will be greater than 2.0. The target will be mounted on a 2 inch square glass plate.	Included in description
#8	Stage micrometer	For use in calibrating reticles and measuring magnification, 2mm scale divided into 200 0.01mm increments mounted on a 25mm x 75mm glass slide.	0.01mm
#9	Microscope grid	50mm x 50mm, 2mm squares. Accuracy ± 0.01mm overall, line widths 0.07mm and 0.15mm.	1.0mm
#10	Microscope grid	21mm disc, 0.1mm squares	0.1mm
#11	Large field grids	Several large grids of different dimensions will be provided. 9" x 9", 4" x 5" can be provided at relatively small cost for examining distortions. The size of the squares will be 1mm x 1mm or 0.2" x 0.2", depending on the overall size of the grid. The grids will be on a dimensionally stable Cronar base. Line widths will be .003" and .006". Spacing will be accurate to .0005".	1.0mm
#12	Translucent Scale	Made from Cronar base grid 2mm increments, 10cm long with numbers at each cm.	2mm

TABLE II (cont'd.)

Item		Description	Precision
#13	Indicator and stand	A dial indicator with .001" divisions and 1" measuring range will be provided with a granite-base stand. The indicator can be moved by means of an adjustable arm to contact moving parts of instruments to be measured. Accurate to ± .0005" over entire range.	0.001"
#14	Light meter	The light meter will be a simple CdS exposure meter with an appropriate conversion chart for reading the light level of a light table.	The accuracy and precision of this instrument will be calculated by the contractor. Although not a laboratory precision instrument, it is felt that its precision is adequate for field testing.

TABLE III

MECHANICAL EQUIPMENT LIST

	Item	Description	Precision
#15	Machinist scale	6" steel rule with four scales on the four edges.	0.5mm, 0.01", 1/96", 1/64"
#16	Tape measure	6' retractible, metallic tape measure	1/8"
#17	Calipers	English and metric scale vernier calipers with inside, outside and depth capabilities to approximately 5".	1/128" or 0.1mm
#18	Surface thermometer	0° F to 300° F, magnetic clamp or silicone grease	± 2° F
#19	Tension tester	A 5 lb. capacity spring scale for use with film or film leaders with holes punched in them. The leaders or film to be supplied by the customer.	1 oz.
#20	Foeppl vibration target	This target consists of two rows of .001" diameter dots on a glass slide. The two rows diverge; the first two dots are .001" apart and the separation increases in .001" increments to .02".	0.001"

TABLE IV

MISCELLANEOUS EQUIPMENT LIST

	Item	Description	Precision
#21	Illuminator	Variable intensity, variable position, variable focus light source.	N/A
#22	Variable angle reflector	1-1/2" diameter front surface mirror in adjustable position holder.	N/A
#23	N. D. filters	2" x 2" N. D. filters, 1. 0, 1. 5 and 2. 0 N. D.; carbon suspension in gelatin	± 0. 05 N. D.
#24	Step wedge	1" x 5-1/2" photographic silver 21-step tablet	Uncalibrated
#25	Spectral filters	Three Wratten color separation filters, 3" x 3"	N/A
#26	Polarizing filter	One 5" x 5" polarization filter, 0. 01" thick	N/A
#27	Lens brush	1" width all camel hair lens and negative brush	N/A
#28	Hand magnifier	3" diameter, 8" focal length, handle	N/A
#29	Stop watch	30-minute elapsed time capacity; individual color coded stop, start, and reset buttons	1/10 sec
#30	Flashlight	A small flashlight with a well-directed beam	N/A
#31	Hole punch	A single-hole paper punch to make the holes necessary for the tension tester	N/A
#32	Case	Custom fitted with foam and straps where necessary to protect contents. Small enough to be carried on airplane trips.	N/A